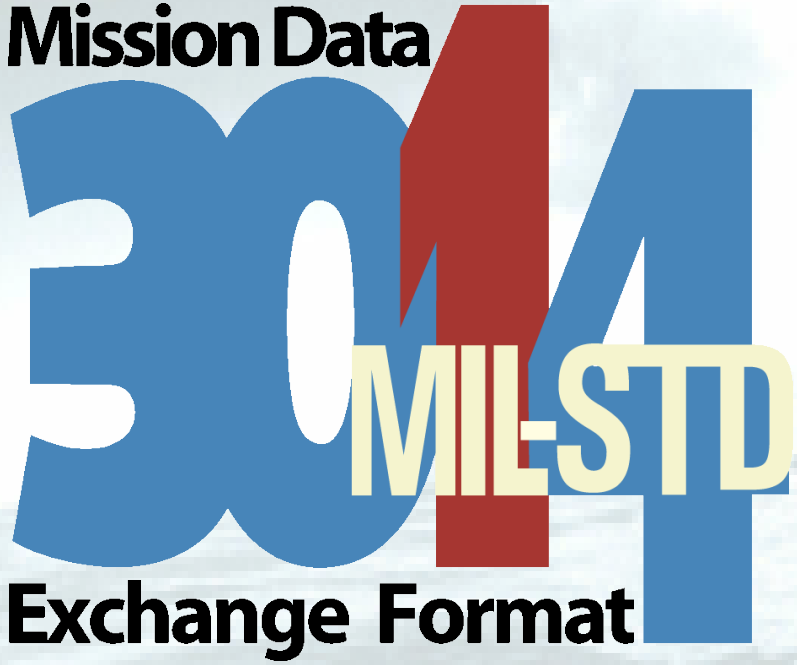
Implementing a Single Mission Data Interface for Platform/Weapon Integration



(formerly known as TPDF)

March 2004

NAVAIR

What is MIL-STD-3014?

- **MIL-STD-3014 IS NOT:**
  - **A data link message standard competing with Link-16, VMF, etc.**
  - **A stores bus data standard competing with MIL-STD-1760**
- **MIL-STD-3014 IS:**
  - **An available DoD military standard**
    - **"Department of Defense Interface Standard for Mission Data Exchange Format"**
  - **A digital file format for mission-specific programming data**
    - **For Precision Weapons**
    - **Also suitable for UAVs/UCAVs, manned platforms, etc.**
  - **An opportunity for transition to Open Systems Architecture**
    - **And the future of military communications**
    - **Through mass data transfer integration strategy on links and buses**

Mission Data 3014 MIL-STD Exchange Format

Putting the "War" in Network-Centric Warfare

Paired to Break the Comms Jam…

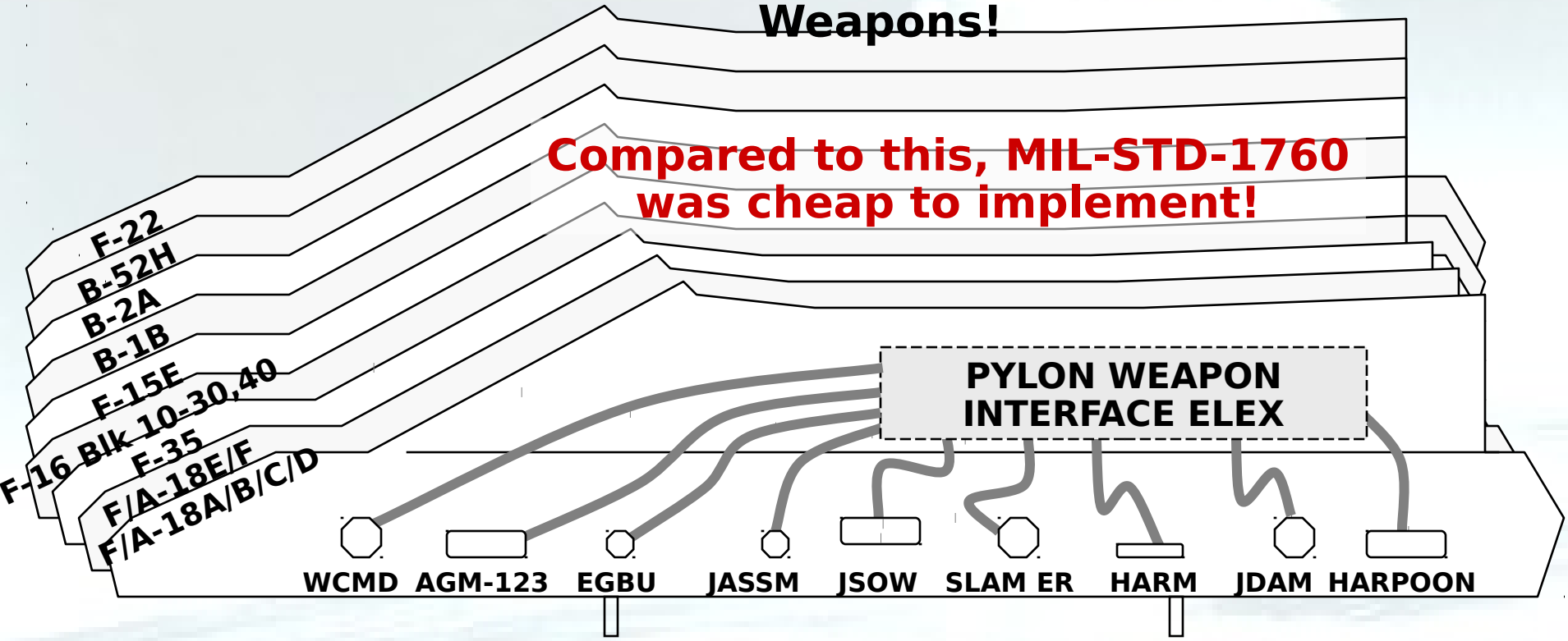
- **MIL-STD-3014**
  - Defines a Digital Data File
  - A general-purpose standard for content format
  - Buffered by a standard header
    - Describes the file's source, destination and size

- **Mass Data Transfer (MDT) Protocols - send bytes, not data elements**
  - Decouple content from comms protocols
    - Channels don't care about contents of a 3014 file, just size & destination
    - Senders and receivers don't care how it gets there, just what's in it
  - If it's a MIL-STD-3014 file, there's only one way to get or send it - MDT!
    - Regardless of the size, source, destination or content

- **When they're paired, every comms channel can use one message**
  - To carry any amount of any content, from any source to any destination
  - Including MIL-STD-1760 Stores Buses
  - Including Tactical Data Links

Our Model - MIL STD 1760

One Hardware/Electrical Interface for all Jets & Weapons!



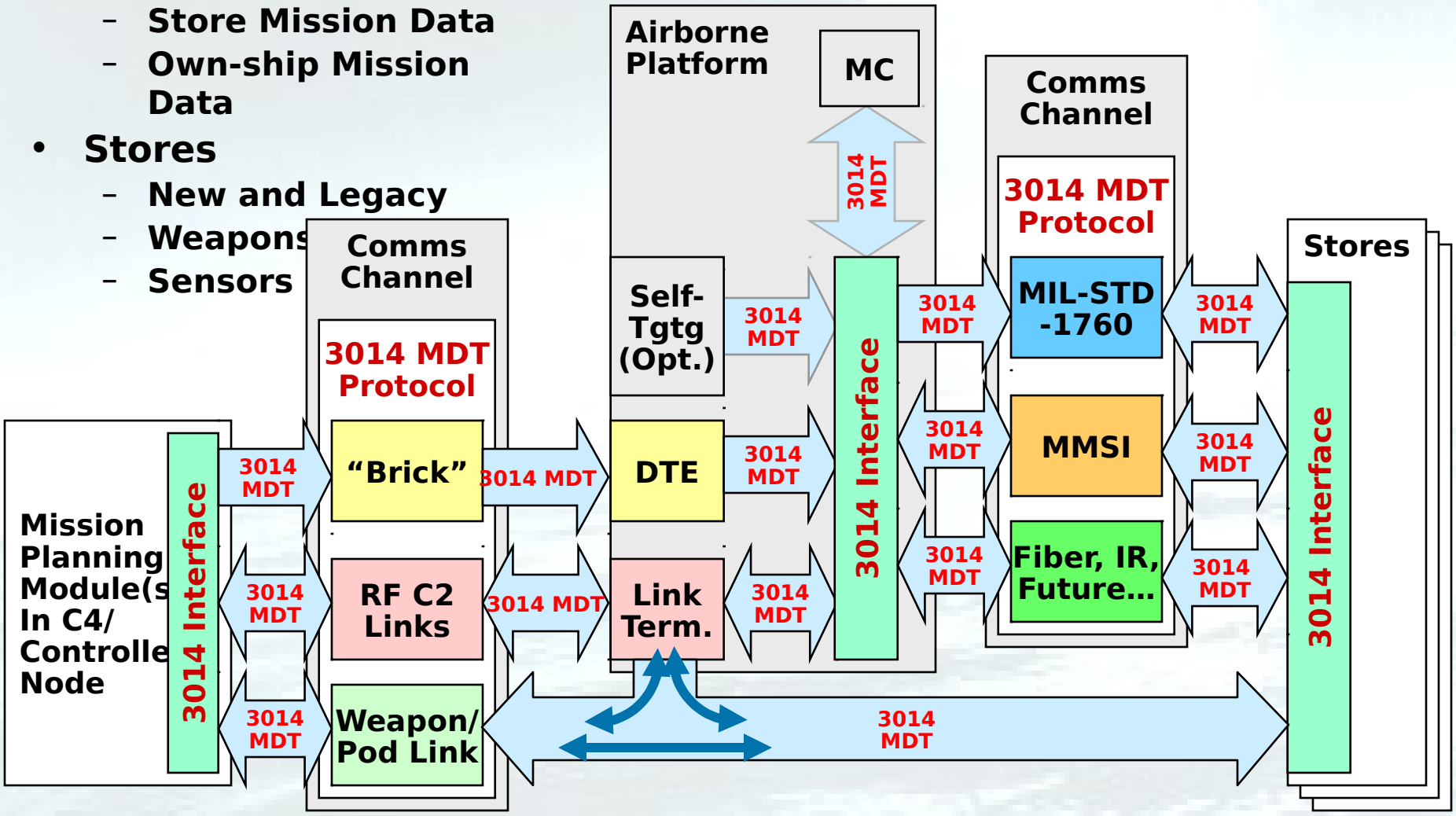
Compared to this, MIL-STD-1760 was cheap to implement!

- **Without MIL-STD-1760, our connectors would be an expensive, complex mess!**
- **Across DoD, our mission data transfer is complex today**
  - **We just don't see it, since there's no hardware**

The MIL-STD-3014 Vision

One Simple Interface for All Mission Data Transfer

- **Airborne Platforms**
  - Store Mission Data
  - Own-ship Mission Data
- **Stores**
  - New and Legacy
  - Weapons
  - Sensors



With This Strategy, Evolution is NO PROBLEM!

- **3014 + MDT = a Single Interface**

- **Faster, cheaper integration**
  - **Adding a new weapon? New variant? New data type? More resolution? New Algorithm? New targeting source? A new radio?**
  - **Once you're using 3014 for data transfer…**
  - **NO PROBLEM!**

- **Greater tactical flexibility**
  - **One 3014-capable channel is down?**
  - **Once you're using 3014, switch to another one!**
  - **NO PROBLEM!**

Legacy Weapon Strategy
Don't Fix What Isn't Broken

- **Leave the Legacy Weapon Alone**
  - Don't touch the weapon, its mission planning, or its 1760 interface
- **One piece of groundside software supports all weapons & platforms**
  - Supports each legacy 1760 "J-weapon" weapon mission file format
  - Condenses it to just real data for one mission, in 3014 file format
  - Formats and transmits via available real-time comms
- **One piece of airborne software per platform**
  - One generic 3014 interface – for legacy and future

What Will MIL-STD-3014 Give Your Platforms and Weapons?

- **Improved Mission Capability**
  - Get full PGM capability, with On- or Off-board Targeting
  - Get full integration of your stores into the NCW environment
    - Push any and all mission data for in-flight updates of all weapons
  - A common, general purpose mission data message on each TDL
    - Very compact file size for each TST mission
    - Yet common header format & handling for ALL FILES
- **Reduced future integration cost and risk**
  - Like MIL-STD-1760, a common interface for all platforms & stores
  - The last mission data interface you'll ever need
  - Legacy support, flexibility, and easy future expansion
- **A long-term-sustainable, evolving solution**
  - Joint Service/Coalition, all autonomous tactical systems

MIL-STD-3014 Status

Publication in Process - Draft Available Now

- MIL-STD-3014 defines format of digital mission data files
- Was reviewed, & edited by Society of Automotive Engineers
  - Avionics Standards Committee
  - Same committee that manages MIL-STD-1760, -1553, & MMSI (for SDB)
  - Approved by (AS-1B subcommittee) on 17 June 2003
    - "Recommended MIL STD" delivered to Government
- Officially released on 20 February 2004
  - USAF ASC/ENOI is publishing agency
    - Lead agency activities
  - USN (NAVAIR) NCW Directorate is Responsible Engineering Officer
    - Technical lead
    - Web page maintenance
    - Manages process for updates to registries and text standard
  - Web Page access for downloads and requests for additions to registries
    - http://MIL-STD-3014.navy.mil

Summary of MIL-STD-3014

- **A new joint standard for weapons, platforms, links, msn planning**
  - **A mission data interoperability complement to MIL-STD-1760**
  - **A basic requirement for extending NCW to Steel-on-Target w/ PGMs**
- **A Link/Platform/Channel Agnostic 'Bit Bucket' for Mission Data**
  - **Open, extensible, non-proprietary file format, similar to ".rtf" or ".pdf"**
  - **Very compact and efficient**
- **Provides a single interface for all mission data on platforms & links**
  - **Isolates information content from comms channel protocols**
    - **All 3014 files are variable length files with a standard header**
    - **All 3014 files are transmitted using mass data transfer protocol**
  - **Supports any content, source, destination, or channel**
    - **Any mix of mission data, in any hierarchical organization**
    - **On-platform and off-platform sources**
    - **Any new or legacy, 1760 or MMSI weapon**
    - **Even uninhabited sensor and weapon platforms**
    - **Wire, fiber, brick and RF channels; it's always just a file!**
- **Rapid on-line process for adding new data to standard**
  - **Including private data types**

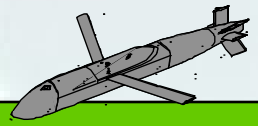
Backup

3014 Carries Whatever Data You Need

- **3014 is a structured data bucket with a common header**
- **Flexible data types, standard & custom**
  - **Primitives (e.g. latitude)**
  - **Concatenated (lat/long/el)**
  - **Module (any combo, primitive / concatenated / other modules)**
- **Add new data types quick & easy with on-line registries**
- **Multiple data types possible in any category**
  - **Mission needs, not comms constraints, drive choice**
    - **Example: Need imagery? Why limit to one format?**
      - **Format need may be driven by proprietary algorithms**
      - **Support them all – JPEG 2000, NITF 2.1, Modified NITF, even edge map**
- **All data types registered & controlled**
  - **But some are private to support proprietary/classified needs**

Legacy Weapon Message Wrapper

Mission Data 3014 MIL-STD Exchange Format



Groundside

Rapid Retarget File Processor

Add Rqd 14R data sets

Add 3014 File Header

MDF

"Weed" Nulls f/ Legacy BDF

JFN / TDM

Send MDF

Legacy BDF

Create Legacy BDF

TAMPS/JMPS Wpn MPM/UPC (Unchanged)

Platform Brick File Integrator

Checksum Index & Directory

Pltfm Legacy Brick BDF

TDL OFP

Transfer Mission Plans

MDF

Segment & Send MDMs

TDL OFP

Transfer Mission Plans

MDF

Rcv MDMs & Assemble MDF

Command from C4ISR
Confirmation to C4ISR

DTD

Platform OFP

Transfer Mission Plans Via Brick & Data Link I/F

Accept MDF, (Finish Assembly?)

3014 Parser

MDF

Read/Strip 3014 Hdr

13R/14R Messages

Add CWs/HWs, Send 13Rs & 14Rs to SMS

Accept (Assign to Sta #) I/F

Brick I/F

Transfer 1760 Files/ Records/ Blocks

14R

13R

1760

SMS

Weapon OFP

(Unchanged)

Mission Software

Mission Memory

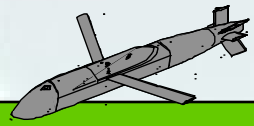
14R

13R

1760 I/F

Native 3014 – One Simple Interface!

Mission Data 3014 MIL-STD Exchange Format



Groundside
Create and Forward Mission Plans

- JFN / TDM
  - Send MDF
- 3014 BDF
- Create TPDF BDF
- TAMPS/JMPS Wpn MPM
- Platform Brick File Integrator
  - Add to Brick
  - Integrated Platform BDF

TDL OFP
Transfer Mission Plans

- MDF
- Rcv MDMs & Assemble MDF
- MDF
- Segment & Send MDMs

TDL OFP
Transfer Mission Plans

- MDF
- Rcv MDMs & Assemble MDF
- MDF
- Segment & Send MDMs

Command from C4ISR
Confirmation to C4ISR

DTD

Platform OFP
Transfer Mission Plans Via Brick & Data Link

- Accept MDF, (Finish Assembly?)
- I/F
- Accept (Assign to Sta #)
- I/F
- Brick I/F
- Identify 3014 File Type & Forward to TPDF Parser

3014 Parser

- MDF
- Read/Strip 3014 Hdr
- 3014 BDF
- MDT 3014 BDF

SMS

- 14R
- 13R
- 1760

Weapon OFP
(Unchanged)

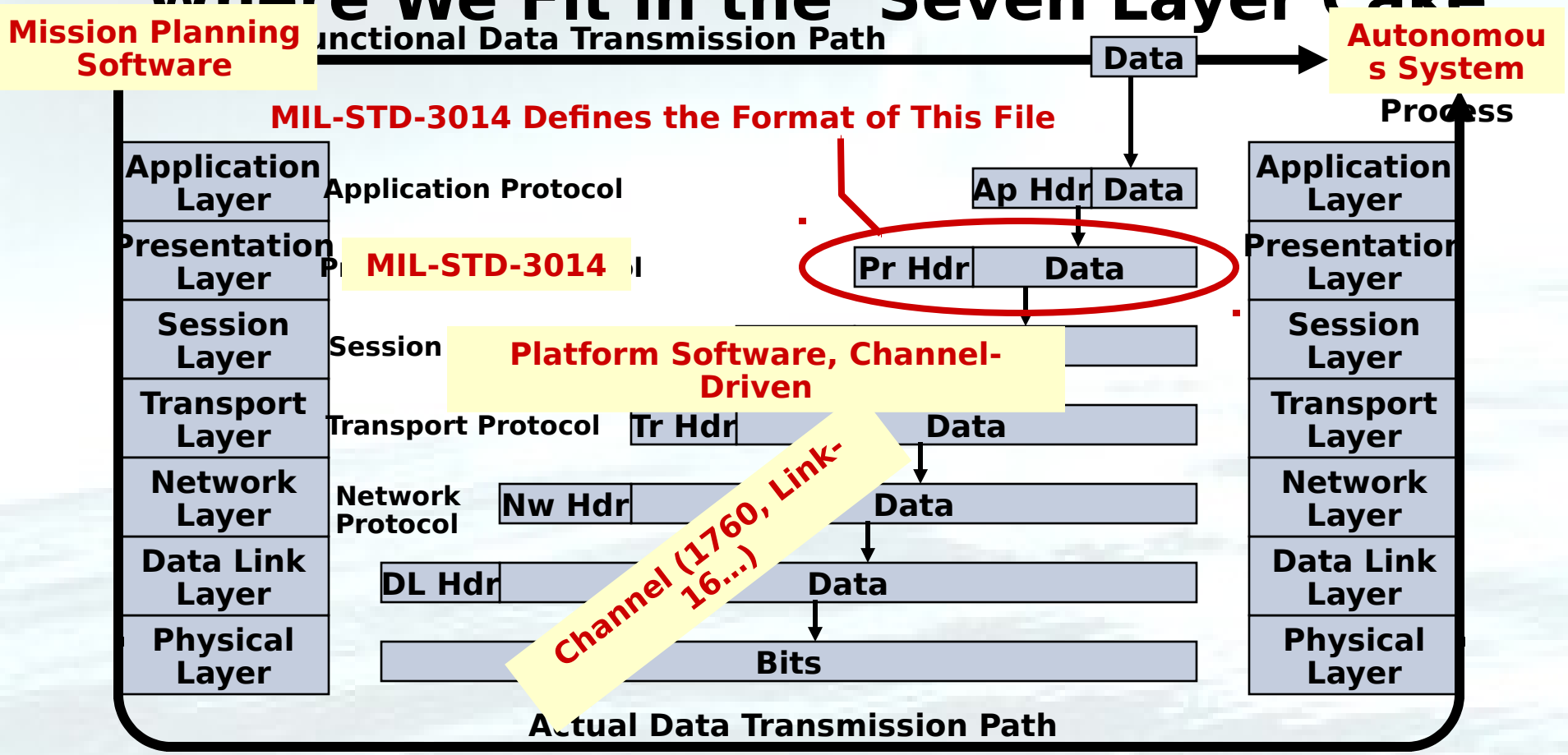
- Mission Software
- Mission Memory

1760 I/F

- 14R
- 13R

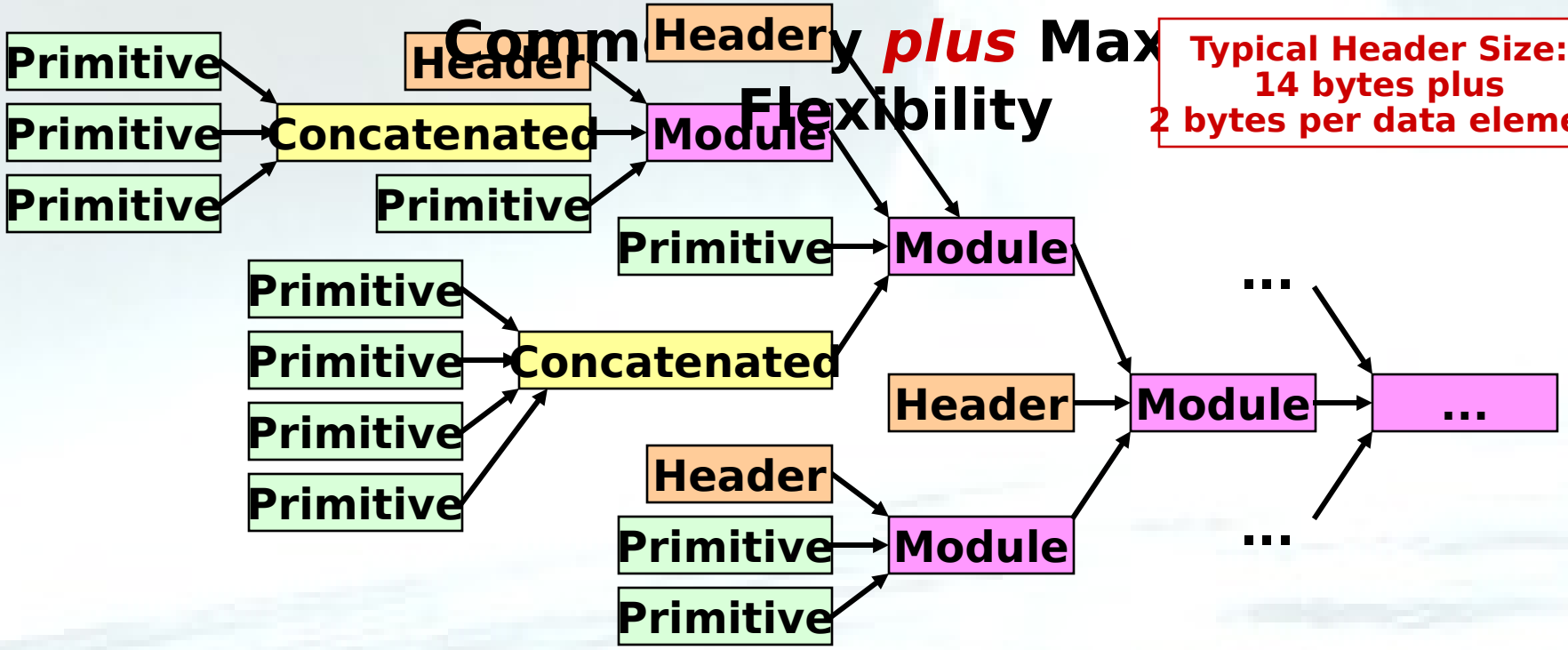
3014 and the OSI Comms Model

Where We Fit in the 'Seven Layer Cake'



3014 Modular File Structure

Commonality *plus* Max Flexibility



Typical Header Size:
14 bytes plus
2 bytes per data element

- MIL-STD-3014 Module: a Header plus any mix of elements
  - All MIL-STD-3014 files are modules
- Scalable from one data element (latitude) to multiple dissimilar mission plans
- All with *No* null data
  - Send only what you *need* to send

3014 Module Header Elements